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## EROSION ON ROADS AND ADJACENT LANDS



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# EROSION ON ROADS AND ADJACENT LANDS

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## Run-Off From Roads Destroys Farm Land

There are over 3 million miles of public roads in the United States. These roads necessarily cut the terrain at all angles and divert run-off from its natural flow. When the natural course of water is intercepted and proper protection is not given to the intercepting highway ditch, deep gullies are formed parallel to the highway, which cause finger gullies to erode back into adjoining fields. Often the erosional debris from these gullies and highway ditches is deposited on good agricultural land. Unless special precaution is exercised in the protection of drainageways and the design and location of culverts, the run-off from roads will cut gullies into the land along the roadway (figs. 1 and 2).

A majority of the main thoroughfares, which carry through or long-haul traffic, have been constructed cooperatively by the State and Federal Governments; in recent years the highway engineers have made considerable progress in controlling run-off waters. The county and township roads, however, have been neglected. These roads, built to serve a local community, are old trails that have been improved with road graders or scrapers and surfaced to facilitate slower moving vehicular traffic. Many of these local roads—and there are 2,684,570 miles of them—are severely damaged by erosion and are in need of repair. They are often the most damaging to adjacent agricultural land.



FIGURE 1.—These gullies, beginning on the highway slopes, will soon cut into the cornfield. There are many gullies like this, starting from the slopes along the country's 3 million miles of highways.

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FIGURE 2.—Improper disposal of water from highways destroys agricultural lands: *A*, erosion at the inlet end of culvert; *B*, erosion at the outlet end of culvert; *C*, run-off from this small culvert has caused an enormous gully below the structure; *D*, excellent farm land destroyed by improper disposal of run-off from the highway; *E*, a culvert built without any protection against erosion in the drainageway below the culvert; *F*, this drainageway was sodded to Bermuda grass after it had been properly shaped.

## **Run-Off From Farm Land Destroys Roads**

Not only does run-off from roads damage farm land, but run-off from farm land destroys roads (fig. 3). The deep gullies that form in highway ditches often can be attributed to the action of uncontrolled run-off from land adjoining the road.

Landowners in some communities are responsible for erosion on highways because they have used the highway ditch as an outlet for a terrace system without consulting with the road officials and without providing any protection against erosion in the highway ditch.



FIGURE 3.—Run-off from the adjacent farm land has left a gully where there was a road.

## **Erosion Multiplies Road-Maintenance Cost**

The maintenance of all main highways is usually the responsibility of the State. Many of the State highway departments realize that much damage is being done to their highways by erosion (fig. 4) and that modern highway construction introduces new problems of erosion control. In recent years they have considered erosion as a major factor when locating roads.



FIGURE 4.—Unprotected areas on highway rights-of-way create gullies that destroy agricultural land and increase the maintenance cost of highways.

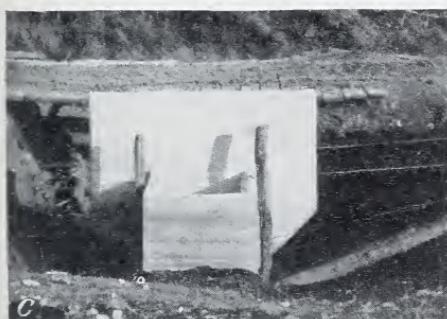
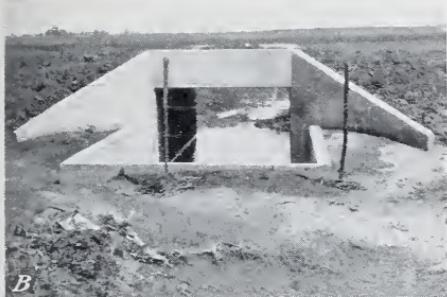


FIGURE 5.—*A*, Serious damage will result if these construction scars are not covered with vegetation. *B*, This drop inlet prevents gully erosion on adjacent land (see fig. 2, *A*). *C*, A drop inlet is being installed to stop the erosion that is undermining this small bridge. *D*, The bridge has been taken out. The drop-inlet structure, here completed, will reduce highway-maintenance cost and conserve the soil on the adjacent land.

When modern highways are constructed through rolling country it is necessary to cut through the hills and fill the valleys in order that the public may be provided with a highway that can be traveled safely under all conditions. These modern - designed highways, which have low gradients and improved alignment and cross-sectional designs, expose large areas of subsoil that are susceptible to erosion. These exposed areas must be covered with vegetation that will prevent erosion on the rights-of-way (fig. 5, *A*). This planting should be done during the original construction period in order not to increase the burden of the maintenance department.

Improved culvert designs that prevent erosion are being introduced (fig. 5, *B*, *C*, *D*), and special designs are being developed to fit local conditions.

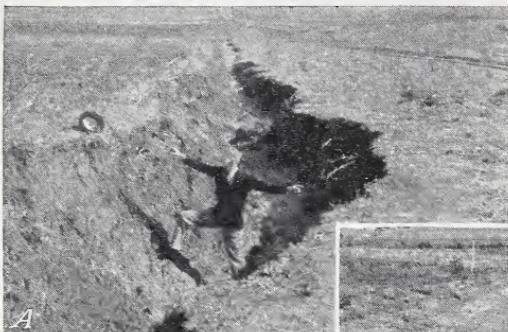
County officials usually have only small appropriations for relocation, repair, or improvement of county and township roads. They are further handicapped by the lack of information as to how they can most effectively check erosion on their highways, and a few may not even realize that erosion is causing much of their highway maintenance and repair cost. Sufficient funds are not available to county road departments to enable them to solve all the problems that confront them. The maintenance of the surfaces is of primary importance. If funds are available after this expense has been met, they may be used advantageously to repair damage caused by erosion and to establish protective measures, provided landowners cooperate.

## Cooperation Saves Fields and Roads

Counties cannot control erosion in all highway ditches—without the cooperation of farmers. For run-off from farm land destroys roads even as run-off from roads cuts gullies on farm land. It is a two-way damage that can be prevented in only one way—by cooperation.

Both farmers and the public will benefit materially if landowners and highway agencies work together to protect road ditches. An un-

protected road ditch may become a gully that will seriously damage the highway and adjacent farm land. It costs much less to protect road ditches before gullies have formed than to fill



A



B

FIGURE 6.—A, The road ditch has become a deep, gnawing gully. B, Bermuda grass is now growing on top of the gully, which has been filled in by sloping the banks. This treatment will protect the road and the adjacent farm land against erosion.

in and sod such gullies as that shown in figure 6. The control of erosion in highway ditches to prevent highway gullies from encroaching on adjoining land often requires that the farmer give easements in order that the proper protection may be provided (figs. 7 and 8).

The practice of discharging run-off from diversion ditches and terraces into unprotected road ditches has aggravated highway erosion and made maintenance more expensive. Furthermore, if the farmer turns water from terraces into a highway ditch that is not protected, overfalls advancing up the channel will soon cause field gullies in the channel of each terrace. When it is necessary to empty terrace water into the highway ditch, the official charged with the responsibility of maintaining the road should be consulted and a cooperative plan worked out to protect the area from erosion. The counties, in cooperation with landowners, could in time cure this type of erosion, which is decreasing private land values and causing severe damage to public land.

The Soil Conservation Service is cooperating with most State highway departments in an effort to obtain information on the subject of economical control of erosion on highways. The procedure by which this information is being obtained is to establish various control measures on a highway in a given problem area. Once an economical solution has been proved for a particular problem, it can



FIGURE 7.—Gullies from the highway are crawling under the fence and into the field.



FIGURE 8.—The cross section of the road in figure 7 has been improved and the fence set back for the fourth and last time.



FIGURE 9.—Maintaining road sections of this type is expensive. The inset shows a revised section and the drainageway sodded to Bermuda grass. The appearance of the road and adjacent farm land has been improved, maintenance operations have been simplified, and road hazards have been eliminated.

be applied on newly constructed highways or adapted to old highways where conditions are similar. The States have been very cooperative in this work, and the Bureau of Public Roads, United States Department of Agriculture, has given its assistance and advice in correlating successful practices with modern highway construction.

The Soil Conservation Service is also cooperating with county and parish highway departments in controlling erosion in road ditches that are being damaged by the run-off water from the agricultural land that the Service has under cooperative agreement (fig. 9). It is hoped that this type of work will result in practical working relations between the farmers and the road officials whereby they may cooperate in preventing erosion that is decreasing land values and increasing taxation by increasing road-maintenance cost.



